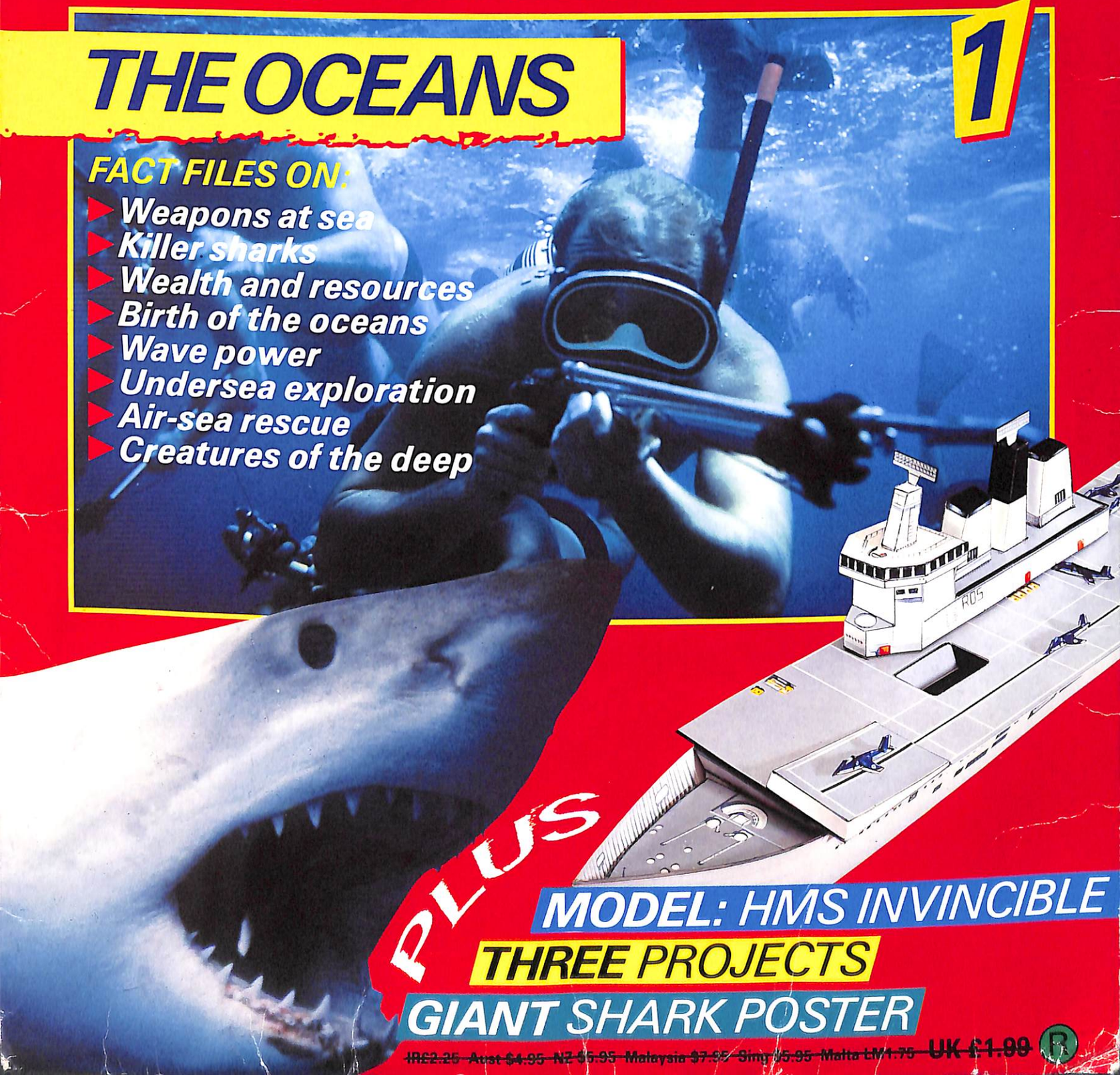
A Marshall Cavendish Collection

EVERY FORTNIGHT

QUEST

ADVENTURES IN THE WORLD OF SCIENCE



THE OCEANS 1

FACT FILES ON:

- Weapons at sea
- Killer sharks
- Wealth and resources
- Birth of the oceans
- Wave power
- Undersea exploration
- Air-sea rescue
- Creatures of the deep

PLUS

MODEL: HMS INVINCIBLE

THREE PROJECTS

GIANT SHARK POSTER

~~IR£2.25 Aust $4.95 NZ $5.95 Malaysia $7.85 Sing $5.95 Malta LM1.75~~ ~~UK £1.99~~

ISSN 1350-3766
01

INSIDE THIS PACK

FACT FILES

- ▶Weapons ▶Sharks
- ▶Divers ▶Resources
- ▶Wave power ▶Fish
- ▶Birth of the oceans
- ▶Air-sea rescue

MODEL HMS Invincible

POSTER Great white death

PROJECT SHEET

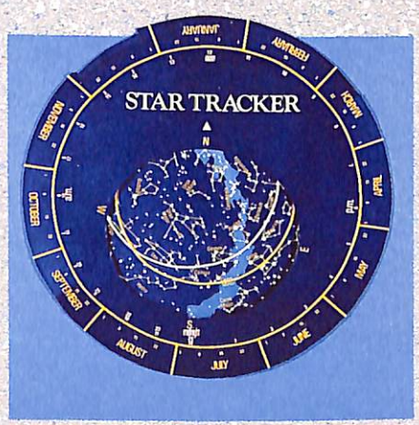
- Make a periscope
- Diver's pressure test
- Buoyancy experiment

COMING IN QUEST 2 MAN IN SPACE

FREE BINDER

FACT FILES INCLUDE:

- ▶Star wars ▶Moonlaunch
- ▶Mission to Mars
- ▶Eye in the sky ▶Astronomy
- ▶The outer planets
- ▶The life of a star



MODEL Make your own Star Tracker

POSTER US space shuttle

IN QUEST 3 – COMMUNICATIONS

More fact files and projects, plus FREE board game and DATAQUEST – your own computer database

GREAT WHITE D

PROFILE

THE GREAT WHITE

Carcharodon carcharias

Habitat All tropical, sub-tropical and warm seas. Avoids colder waters.

Size Maximum 8 metres. Average 3.5 metres.

Colouring Slate-brown or grey on top, white underneath.

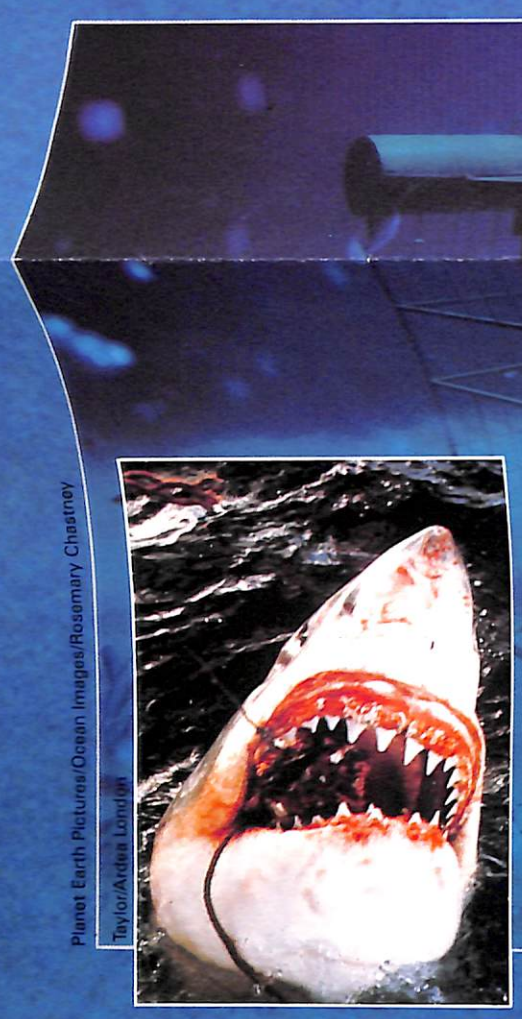
Lifespan Anything from 25 to 100 years – barring accidents!

Bite power The bite of a 2 metre shark has been measured at 3 tonnes per sq cm. (The most powerful human bite power is only around 115 kg per sq cm).

Speed Average cruising speed of around 3.2 km/h. Top speed up to 35 km/h.

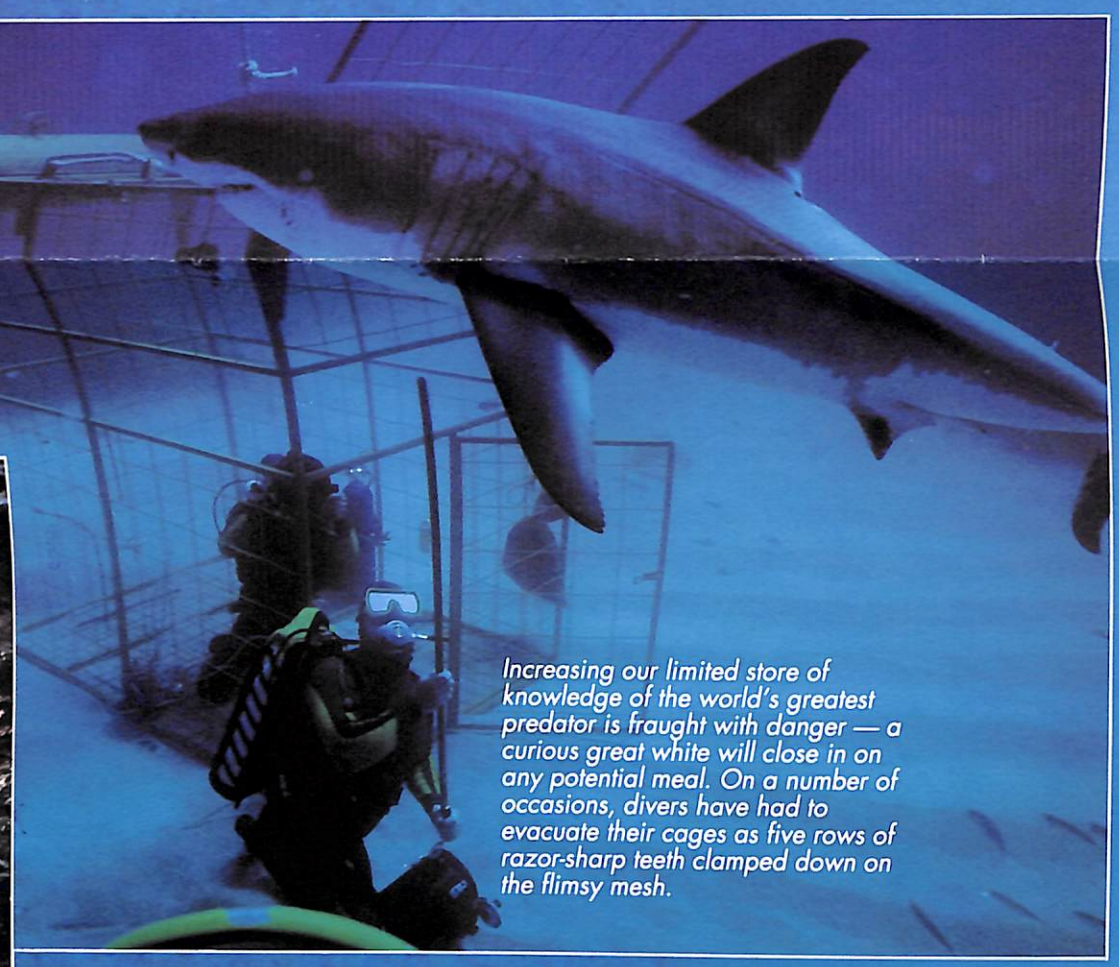
Diet Carnivorous (meat-eater) – will eat most fish, including squid and smaller whales, also dolphins, seals and sea-lions. The acid in a great white's stomach is powerful enough to corrode steel!

Taylor/Ardea London



Planet Earth Pictures/Ocean Images/Rosemary Chastney

Taylor/Ardea London



Increasing our limited store of knowledge of the world's greatest predator is fraught with danger — a curious great white will close in on any potential meal. On a number of occasions, divers have had to evacuate their cages as five rows of razor-sharp teeth clamped down on the flimsy mesh.

ANATOMY OF A KILLER SHARK

MUSCLE STRUCTURE

Some of the muscles used for swimming are called 'dark muscle'. These are naturally warmer than other muscles. Since warm muscle is more efficient than cold muscle, these enable the shark to swim at faster speeds for a long time.

SPIRAL VALVE

A part of the intestine, which is shaped like a spiral to help the shark absorb a lot of food in quite a small space.

LIVER

The liver is particularly oily, to stop the shark sinking – oil is lighter than water. The liver is also very large, as much as a quarter of the shark's body-weight.

CLASPERS

Attached to the pelvic fin in male sharks, these structures transfer sperm into the female reproductive channel.

SKIN STRUCTURE

The whole of the shark's body is covered in an armour-plating of tiny sharp teeth, called denticles.

SENSORS

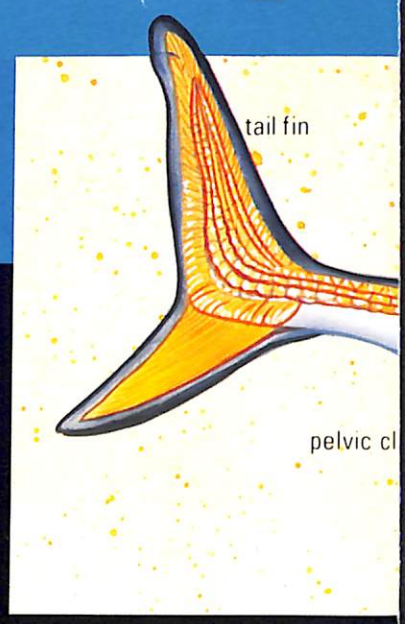
These tiny pits near the nose detect the small electrical fields generated by all living creatures. This helps the shark judge the distance and strength of potential prey. They work together with a line of sensors that runs along the length of the body under the skin next to the backbone. These are sensitive to vibrations in the water. By using the head sensors and the backbone sensors, the shark can tell how far away and how big its prey is.

EYES

Vision is generally good up to about 15 metres. Beyond this, the shark is able to make out moving shapes against the background, but cannot see any sharp detail. When the shark swims into very bright water, it draws a dark covering over the inside of the eye to protect it, since the eye is not protected by an external eyelid.

SKELETON

Sharks have no bones; their skeleton is made up of cartilage – the same gristly material that human ears are made of. Because cartilage on its own is flexible, it is covered in a coating of calcium – the same material that makes human bones and teeth rigid.



QUEST

EATH

OTHER KILLERS

TIGER SHARK

Taylor/Ardea London

Galeocerdo cuvier

Habitat Worldwide in warm seas; all depths; inshore and offshore.

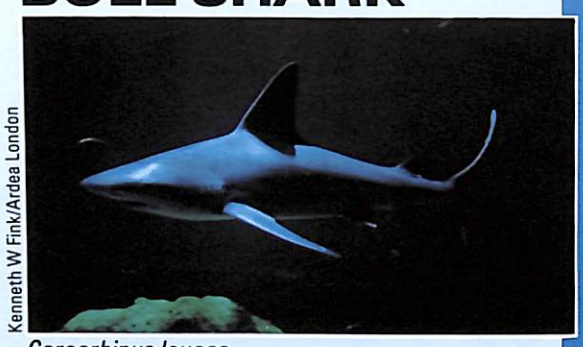
Size Maximum 7.5 metres. Average 3.4 metres.

Colouring Grey/black stripes.

Diet Omnivorous (will eat anything): other sharks, turtles, dolphins, sealions, jellyfish and garbage. It can vomit at will, and can store food in its stomach without digesting it.

Killing power Generally thought to be as murderous as the great white.

BULL SHARK



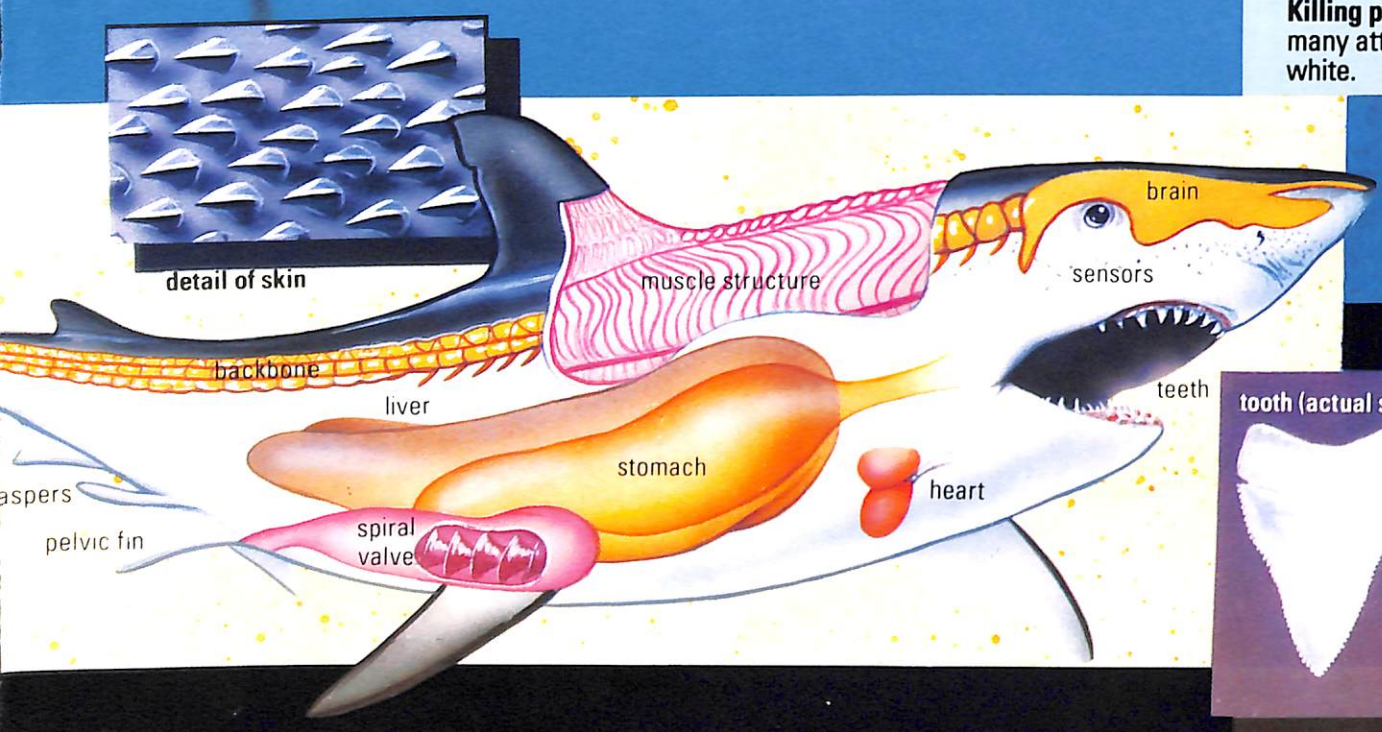
Kenneth W Fink/Ardea London

Carcharhinus leucas

Habitat Shallow inshore waters; rivers, bays; also near ports.

Diet Sharks, rays, its own pups.

Killing power Deceptively dangerous; many attacks are attributed to the great white.



BRAIN

Up to two-thirds of the brain is devoted to the sense of smell. The nose can detect tiny amounts of chemicals in the ocean, as little as one part in ten billion. The brain is large – about 15 cm in a shark 2 metres long.

TEETH

There are up to five rows of backward-pointing teeth, each with serrated edges. But the teeth are brittle, and constantly break off. As each old tooth breaks off, a new one moves forward to replace it. Their top and bottom teeth are used in different ways. Prey is first impaled on the pointed lower teeth. The upper teeth then come down to saw away a chunk of flesh.

MODEL ASSEMBLY INSTRUCTIONS

HMS INVINCIBLE

You will need

Scissors • Ruler • Craft knife • Glue

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler to make folding and gluing easier. Study the ASSEMBLY DIAGRAM to see how the pieces fit together, and use dotted lines as a guide for positioning.

NB Younger children will need supervision when using a craft knife.

To make up

Hull

1 Cut out base **A**. Fold side flaps and tabs up.
2 Cut out **B**. Fold side and back flaps down, and front flap up (see ASSEMBLY DIAGRAM).
3 Glue side flaps of **A** on to edge of side flaps **B** to form inner deck.
4 Cut out **C** and **D**. Glue tab on front of **D** to front of **C** to form bow point. Glue bottom edges of **C** and **D** on to flaps and tabs of **A** to form the hull.
5 Cut out **E**. Fold tabs down and glue to inside top edge of bow between dotted lines.
6 Cut out **F**. Fold tabs down and glue sides and bottom to inside edges of hull **C** and **D**, and base **A**.

Flight deck

1 Cut out flight deck **G**. Use a craft knife to cut along the three solid lines of the two rectangles and fold flaps down to form elevator bays. Apply glue to top tab on **F** and stick to underside edge of flight deck **G**. Fold front tabs of flight deck down and tuck under edge of **E**, without gluing (see ASSEMBLY DIAGRAM).
2 Cut out **H**. Fold to shape and glue tab to opposite end to form the walls of the control tower.
3 Cut out **I**. Fold short tab down, long tab up and glue to inside edges of control tower (see ASSEMBLY DIAGRAM).
4 Cut out **J** and cut six slots as indicated. Fold front section up and glue sides and back to inside edges of control tower **H** to form bridge house.
5 Cut out **K**. Cut slots and fold tabs down.
6 Cut out **L**. Fold and glue to shape. Glue tabs of **K** to inside top edge of **L**. Apply glue to back (longest) edge of **L** and stick in position to inside back edge of **J**.

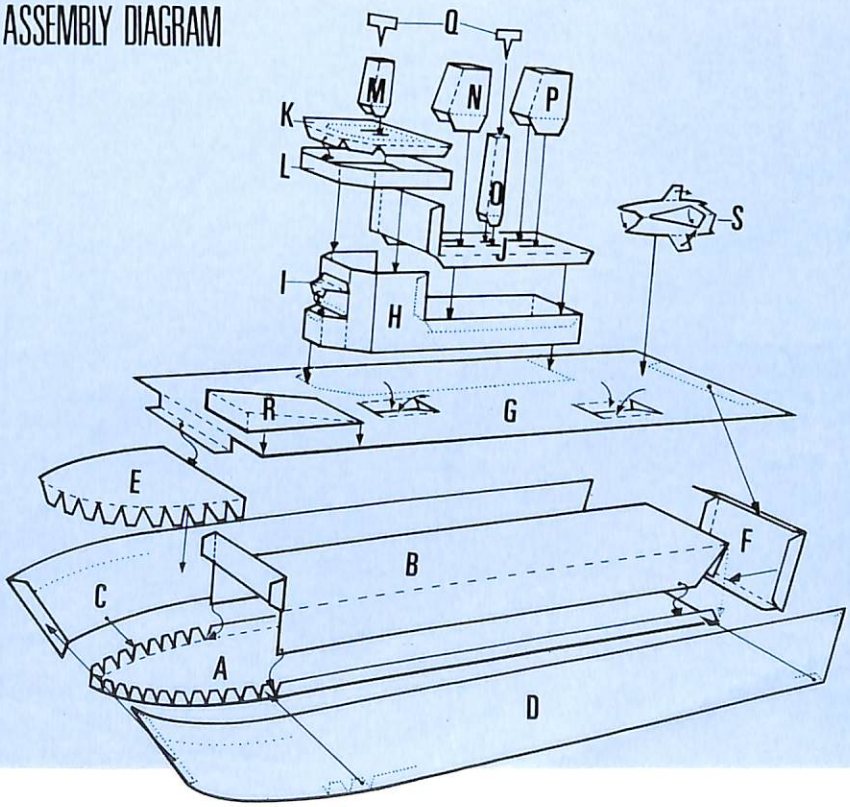
Sonar towers and funnels

1 Cut out **M**. Cut slot, fold and glue into shape to form sonar tower. Fold down roof and glue tab to inside edge of tower. Push bottom tabs into slots on **K**.
2 Repeat this process with sonar tower **O** and push tabs into middle slots on **J**.
3 Cut out **N**. Fold and glue into shape to form funnel. Push tabs into slots at front of **J**.
4 Repeat this process with funnel **P** and push into slots at back of **J**.
5 Fold tabs on lower edge of control tower **H** inwards and glue in position on dotted lines on flight deck.

To finish

1 Cut out both **Q**s and push pointed edges into slots on towers **M** and **O**.
2 Cut out **R**. Fold and glue into shape to form 'ski jump'. Push tabs under and glue in position on dotted lines on flight deck.
3 Cut out the four **S**s. Cut out centre section, fold jet in half and glue back to back. Apply a little glue to wing tips and position on flight deck.

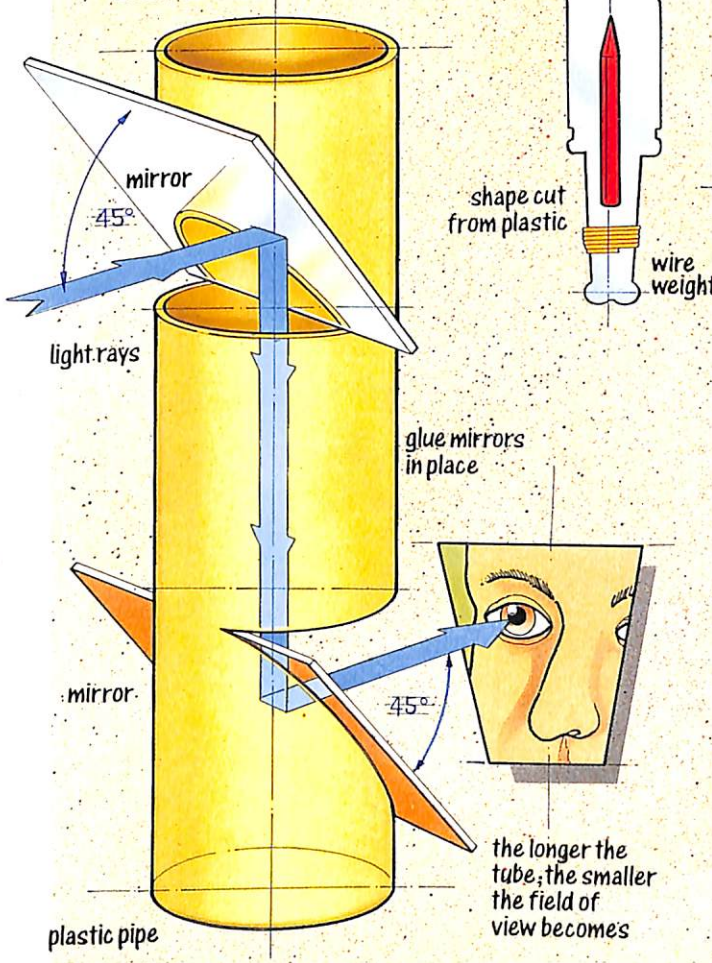
ASSEMBLY DIAGRAM



Q PROJECTS

1~THE OCEANS

- How does a submarine commander scan the seas above?
- What makes a body float or sink?
- Why can't deep sea divers simply breathe through a longer snorkel tube?



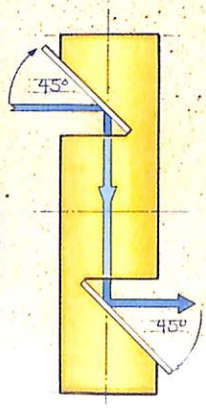
MAKE A PERISCOPE

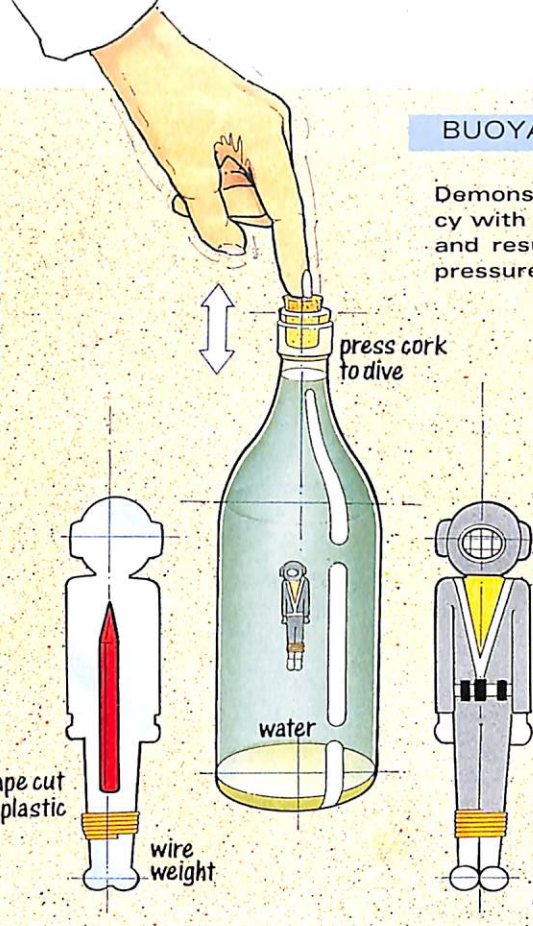
1 2 **3** 4 5

This model periscope demonstrates the principle of how a submarine's captain can scan the surface of the seas, while the submarine remains submerged in the ocean depths. Make your own periscope and use it to see over crowds, walls or fences.

With a hacksaw, cut two large notches in a length of plastic pipe or cardboard tube, as shown. The sloping cuts should be at 45° to the length of the tube. Fix two small mirrors in place with shiny sides facing each other.

Check that the angles are 45° before gluing the mirrors in place: if the angles are incorrect, you may not be able to see through the instrument. If necessary, adjust the angles of the mirrors by gluing small pieces of card behind them.





BUOYANCY TEST

1 2 **3** 4 5

Demonstrate the principle of buoyancy with this model diver. Make it dive and resurface simply by altering the pressure inside the bottle.

Draw the diver on to a piece of thin, flat plastic – any plastic container will do. Cut it out, wind just enough wire or strips of aluminium foil around the feet to make the diver float upright in a sink or bowl of water.

Seal one end of a piece of an old ballpoint pen refill tube by heating it over a flame, rotating it slowly in your fingers. Glue the tube to the back of the diver, and, if you wish, paint in some details using waterproof model enamel paint.

Fill a clear glass wine bottle with water and drop in the diver. Soak the cork to make it pliable and insert it in the bottle.

Pushing the cork a little way into the bottle increases the pressure inside, forcing some of the water up into the refill tube. This increases the diver's weight, making it sink. Pulling the cork out a little, reduces the pressure and the diver's weight, so that it rises.

John Houghton

UNDER PRESSURE

1 2 3 **4** 5

Why do snorkels have short tubes? Would a long tube enable a diver to breathe at greater depth than a snorkeller? Find out the answers by trying this experiment in a swimming pool.

Pick a spot in a swimming pool where your feet just touch the ground. Now stand upright, with the back of your head under water and only your nose and lips showing above the surface. You will find it surprisingly difficult to breathe in. Your lungs are already so deep under water that the lung muscles cannot easily cope with the difference in pressure between the outside air and the water. If you were to go even deeper with a long snorkel, your lungs would collapse under the heavy water pressure.

PROJECT INFORMATION

1 2 **3** 4 5

Each ***QUEST*** *project has been given its own difficulty rating:* **1** *very simple* **2** *simple* **3** *intermediate* **4** *advanced* **5** *complicated.*

Parents should ensure that experiments involving sharp tools, water and electricity are supervised. The publisher can accept no responsibility for injury.

WARNING!

Do not attempt either of these experiments without parental supervision.

A Marshall Cavendish C

EVERY FORTNIGHT

INTRODUCING

QUEST

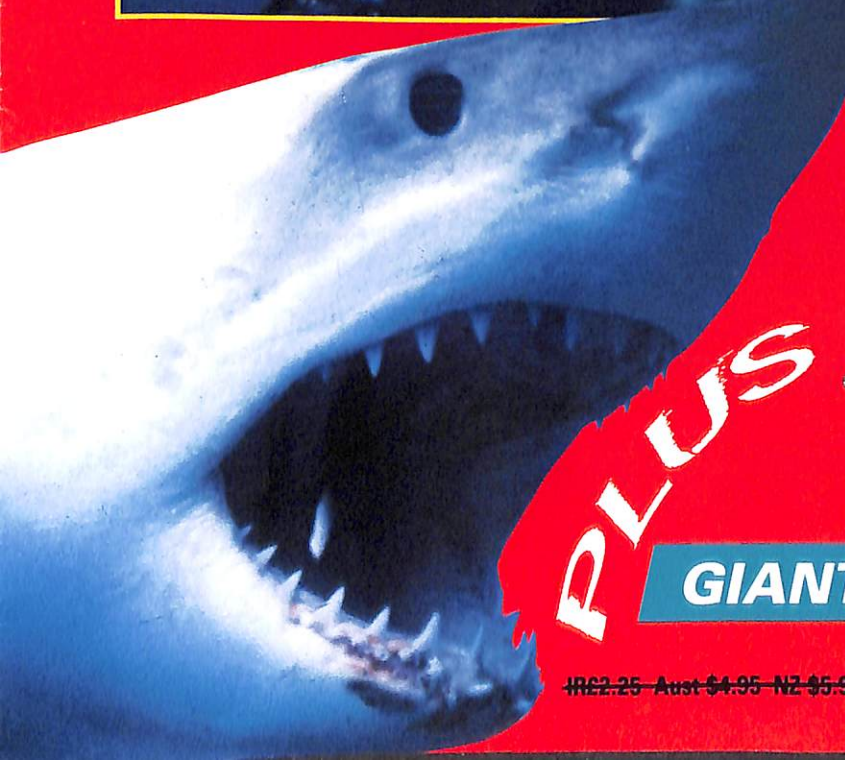
ADVENTURES IN THE WORLD OF SCIENCE

IN EACH ISSUE

SPECIAL INTRODUCTORY OFFER 30p

FACT FILES ON:

- Space Frontiers
- Futures
- Energy and Resources
- Planet Earth
- The Living World
- New Technology



PLUS

PROJECTS

SCALE MODELS

GIANT COLOUR POSTERS

~~IR£2.25 Aust $4.95 NZ $5.95 Malaysia $7.95 Sing $5.95 Malta LM1.75~~ ~~UK £1.99~~ ®

In each issue...

QUEST

A NEW ADVENTURE

Quest has been specially designed to keep pace with today's fast-changing world – and to look forward into the future. Issue by issue it explains more about the scientific principles, people and events that shape our lives, and helps prepare for the challenges that lie ahead.

Use this brochure to discover how to make the most of your *Quest* collection.

Each pack is built around a major scientific theme. The theme – for example OCEANS, MAN IN SPACE, COMMUNICATIONS – is explored across the whole spectrum of scientific experience under the headings shown below. As you build your collection of fact file pages, posters models and projects, *Quest* becomes a voyage of excitement into new areas of knowledge.

- SPACE FRONTIERS
- THE LIVING WORLD
- FUTURES
- ENERGY AND RESOURCES
- PLANET EARTH
- NEW TECHNOLOGY

The FACT FILE PAGES can be separated from each other and stored in your ring binders. Each page is labelled, and can be filed under one of the subject areas shown left.

How QUEST Works

DIVIDER CARDS will be provided free with part 4 of *Quest*. Place them in the binder in the order that suits you best – you may want to put the most often used sections towards the front.

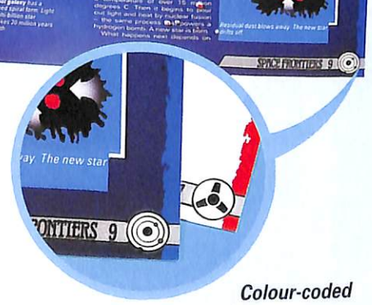
Each divider card is colour-coded and clearly marked with its section title: Planet Earth, Space Frontiers and so on. The symbol for each section also appears on the front of each divider card.

To make filing quick and easy, the correct colour code, section title and symbol are shown on the front of each fact file page.

Every *Quest* fact file page is packed with information and data, artwork and full colour photographs, which all combine to explain the subject clearly and concisely. Look out for special features such as:

JUST AMAZING!
Facts that are weird and wonderful, strange and mysterious, or simply almost unbelievable, illustrated in a light-hearted cartoon style.

INTO THE FUTURE
A peep into tomorrow's world. *Quest* keeps pace with changes as they happen, and Into The Future artwork strips show things the camera can't. They may be inventions still on the drawing board or an artist's impression of life in the 21st century.



Colour-coded for easy filing.

FILING IS AS SIMPLE AS ABC.

A. Look out for the colour-coded section.
B. Check the section title and symbol on the front of each page.
C. File each page by number under the appropriate section.

QUEST Spectrum of Knowledge

Each of the chosen themes is closely examined across several areas of knowledge. As you store the pages in your ring binders, you build up an ever-growing file of information on the whole scientific world arranged into six sections. In every set of fact file pages you will find data under some or all of the following headings:

NASA, Lynden B Johnson Space Centre, Houston

Nelson Medina/SPL

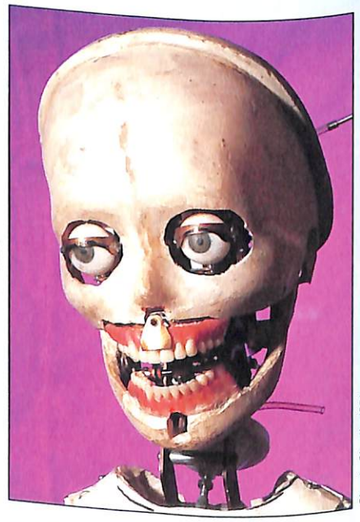
SPACE FRONTIERS

Everything that happens outside the Earth's atmosphere, from living in space to star wars, from black holes to spy satellites and from Mars to Pluto is the concern of this section.

NEW TECHNOLOGY

The section that covers how things work, and how man applies the lessons of the past to prepare for the future. Computers, weaponry, machines and engineering are just some examples.

Alexander Tsiaras



Claude Chatlier/SPL

Nelson Medina/SPL

FUTURES

Looks ahead towards the discoveries and inventions of tomorrow. Research and development in areas as diverse as robotics, cloning, the next generation of armaments and the eradication of disease.

THE LIVING WORLD

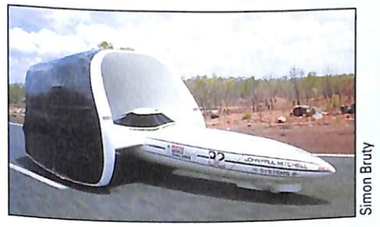
Anything that grows, breathes and moves will be featured here. Data on all forms of life on earth, including plants and animals, medicine and the human body are included.

Mantis Wildlife films/OSF

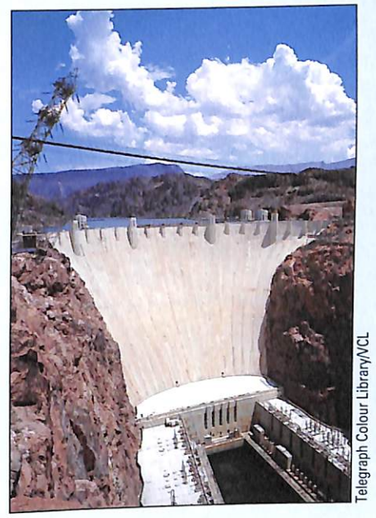
Stephen Dalton

ENERGY AND RESOURCES

The raw materials for sustaining life and the world's economies are among the topics covered here: for instance, nuclear and wave power, mining, fossil fuels, agriculture and farming.



Simon Bruty



Telegraph Colour Library/VCL

PLANET EARTH

Deals with the important issues regarding our relationship with the planet we inhabit. People and places, the elements, ecology, conservation and mapping are typical subjects of pages in this section.

Nelson Medina/SPL

Gray Mortimer

IN-QUEST

A GAME FOR TWO TO SIX PLAYERS

THE OBJECT OF THE GAME is to get all six of your counters on their matching marks in each of the six target areas (Futures, New Technology, Planet Earth, The Living World, Space Frontiers, and Energy and Resources). Players move from circle to circle by answering questions correctly.

TO PLAY

Each player chooses how he wishes to travel to the target areas, and takes six counters of the same sort (either helicopters, jeeps, tanks, submarines, battleships or aircraft) and stacks them in the 'base' – the hexagonal area in the centre of the board.

Place the question cards in a container that does not allow you to see the questions or answers.

The first player (chosen at random) selects the target area – Futures, Space Frontiers etc. – that he would like his first question from.

The player to his left picks the top card from the deck and asks the first player the question on his chosen target area. After checking the answer on the back, he returns the card to the bottom of the deck.

GETTING IT RIGHT

If the player answers correctly, he moves his counter – of the same colour as the target area chosen – out of base on to a matching coloured circle on the inner ring (i.e. if he answers a Futures question, he can move on to a purple circle). He then gets another turn. If he answers correctly again, he can *either* move the same counter further towards the target area chosen, *or* move a second counter out of base towards another target area.

AT ANY ONE TIME, A PLAYER CAN ONLY HAVE TWO COUNTERS ON THE MOVE

If a player decides to move his first counter on, for this turn only, he has a choice of opting for the nearest coloured circle to his left or his right.

Once again, he is asked the corresponding question from the top card of the deck by the player on his left. If he is right, he moves on to that coloured circle. He is then asked the question of the coloured circle ahead.

ANY PLAYER CAN HAVE ONLY THREE TURNS IN SUCCESSION

After three successful turns by any player, it is the turn of the player on his left.

GETTING IT WRONG

If a player gets an answer wrong, he remains in the same position, and the player to his left plays next.

CHALLENGING TACTICS

Any player can land on another player immediately ahead of him by asking for the question of the circle ahead. If he answers correctly, he moves on to that circle and the original 'occupant' must return to base.

If the challenging player answers incorrectly, he must return to base.

GETTING ON TARGET

To arrive at a target area, the player must answer the question of that category correctly. If he does not, he must return to base.

THE WINNER

The first player to get his counters 'home' to all six target areas is the winner.

▶ **Please keep the rules of the game safe. The IN-QUEST board and 15 question and answer cards will be given FREE with part 3.**

QUEST Plus

***Quest* is so much more than a collection of fact files. Each pack also contains extra elements which, every fortnight, aim to expand scientific horizons as well as entertain.**

POSTERS

In every *Quest* pack you'll find a giant colour poster. Whether you put it on the wall or save it in the pack for future reference, the poster sums up the theme of the issue and provides a superb photo or artwork to explain even more about its subject.

How does the space shuttle work? What will the next high speed train look like? What happens when you fire a Magnum .44? Your collection of posters will show all this and much more.

PROJECTS

Quest project sheets translate science theory into science fact. Carefully graded on a difficulty scale of 1–5, the projects suggest experiments and activities which are linked to the theme of each issue of *Quest*.

You may need to find a few everyday household objects to carry out some of the projects, but many of the ideas require no more than will power and brain power! These pages are designed to help with school projects or lead on to new ones.

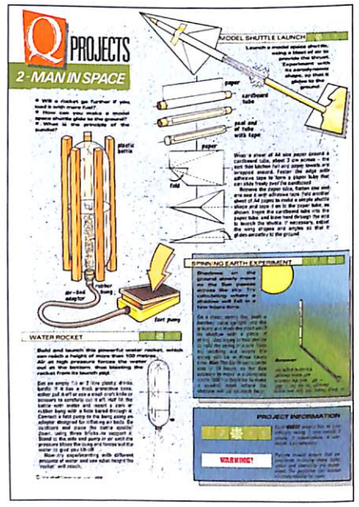
IN-QUEST

An exciting board game to test your scientific knowledge and pit your wits against friends and family.

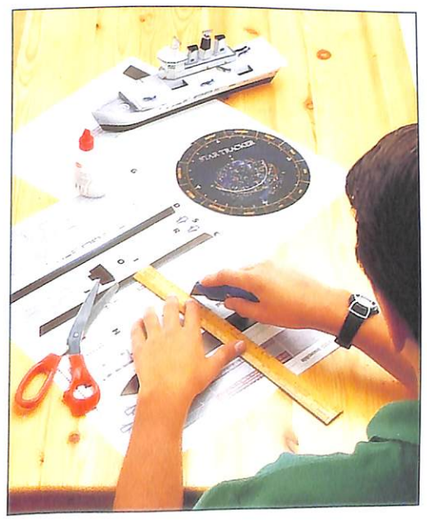
The board comes **FREE** with part 3; question and answer cards are provided regularly inside *Quest* packs.

As the series develops, your collection of cards grows, making *In-Quest* even more challenging.

Based on *Quest's* six areas of scientific knowledge, the game involves a race to victory. The more you know the quicker you win.



MODELS



Simple to assemble and pre-printed in full colour, *Quest* models re-create some of the world's most innovative structures and ideas.

You won't need complicated tools or equipment – in most cases the models can be finished by using just glue and a craft knife. And each model has been carefully planned to be correct in scale and detail.

Some models, like the Star Tracker (left), can be used over and over again. Some provide valuable insights into the inner workings of machines, some demonstrate important scientific principles.

DATABASE

In Part 3 *Quest* introduces yet another new element – **DATA-QUEST**. The poster will show how to program a computer for storing lists and other data relating to the information in the fact files. Easily accessible data will be supplied on project sheets from time to time – simply feed it into your computer ready for instant reference.

DATA-QUEST starts with database programs for the Commodore 64 and Spectrum computers. Other popular machines will be covered in future issues.

THE EXPERTS

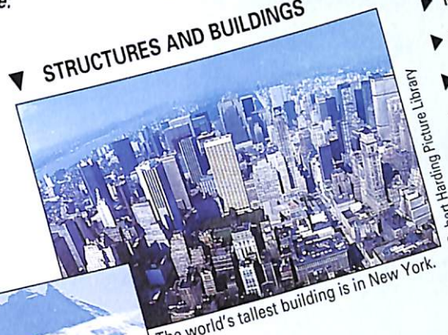
Quest has been created by a panel of experienced scientists and science writers. The publishers are grateful to the ***British Association for the Advancement of Science*** *for their co-operation.*

QUEST Themes

EVERY FORTNIGHT QUEST tackles a particular THEME. As with 'The Oceans' in Part 1, the elements of each pack all relate to a given topic. Future themes include:

- MAN IN SPACE
- SOUNDS
- CITIES AND COMMUNITIES
- THE WRITTEN WORD
- THE ANCIENT WORLD
- HEALTH AND DISEASE
- THE PARANORMAL
- POLLUTION
- JUNGLES
- THE SEARCH FOR FOOD

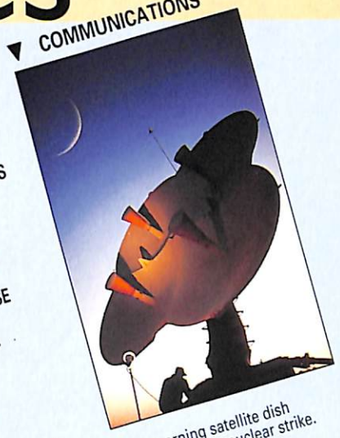
STRUCTURES AND BUILDINGS



The world's tallest building is in New York. Or is it?

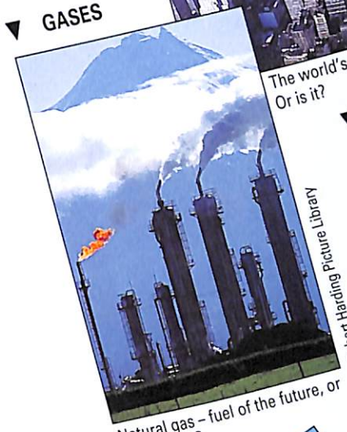
Robert Harding Picture Library

COMMUNICATIONS



Early warning satellite dish – watching for a nuclear strike.

GASES



Natural gas – fuel of the future, or spent force?

Robert Harding Picture Library

FLIGHT

Why does the horsefly need multi-coloured eyes?

CRIMEBUSTERS

Training techniques – new ways to combat crime.

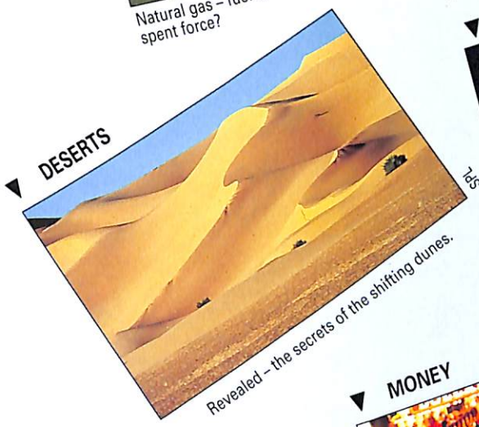
Frank Spooner Pictures

IMAGES AND LIGHT

Holography – how will man harness the 3D miracle?

SPL

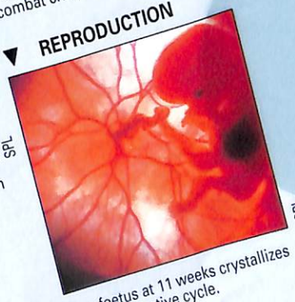
DESERTS



Revealed – the secrets of the shifting dunes.

SPL

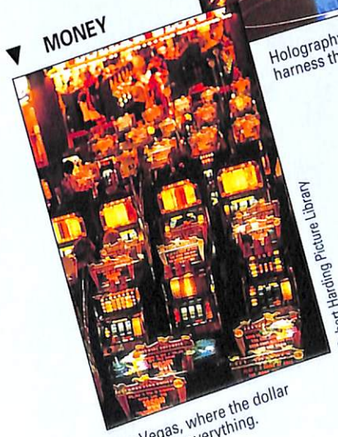
REPRODUCTION



The foetus at 11 weeks crystallizes the reproductive cycle.

SPL

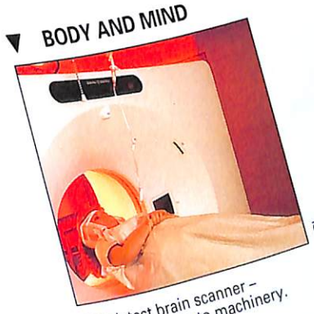
MONEY



Las Vegas, where the dollar counts for everything.

Robert Harding Picture Library

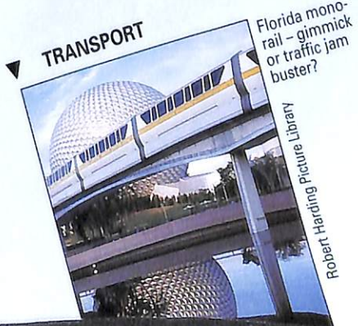
BODY AND MIND



The latest brain scanner – mankind's debt to machinery.

SPL

TRANSPORT



Florida mono-rail – gimmick or traffic jam buster?

Robert Harding Picture Library

Coming Soon:

Issue 2

Includes:
FREE BINDER

MAN IN SPACE

- Earth and the Milky Way
- How a star is born
- Survival in space
- Spy in the sky
- Shuttle service to the stars
- The outermost Planets
- Star Wars – will it happen?
- Telescopes for the future
- Manned missions to Mars
- Moon-Walk

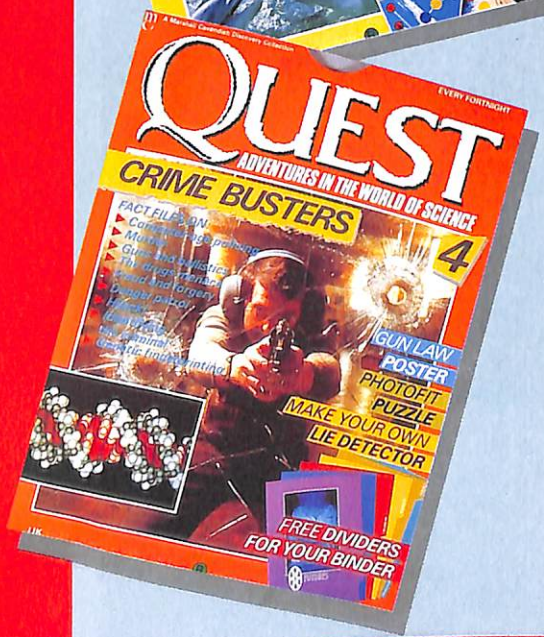
MODEL Make your own Star Tracker

Issue 3

COMMUNICATIONS

- Disc versus tape – the audio visual revolution
- The world of television and radio
- Telephones for the future
- Modern mail – and facts about fax
- How animals converse
- Satellites – relaying messages through space
- Inside print technology
- Waiting for alien messages

IN QUEST 3
More fact files and projects, plus **FREE** board game and **DATAQUEST** – your own computer database



Issue 4

CRIMEBUSTERS

- Violence on the streets
- New ways to identify the criminal
- Guns – and the science of ballistics
- Fraud and forgery
- Drugs deterrents
- Hijack and terrorism
- Murder – the victims and assailants

FREE DIVIDER CARDS

MODEL Celebrity photofit